Date of Issue:
10 April 2014

SAFETY DATA SHEET

1. SUBSTANCE AND SOURCE IDENTIFICATION

Product Identifier

SRM Number: 1838
SRM Name: Ethanol (10 volume percent) in Reference Fuel
Other Means of Identification: Not applicable.

Recommended Use of This Material and Restrictions of Use

This Standard Reference Material (SRM) is intended primarily for use in the calibration of instruments and the evaluation of methods used for the determination of ethanol in gasoline. A unit of SRM 1838 consists of a set of five 20 mL unscored ampoules containing gasoline with 10 % (volume fraction) ethanol.

Company Information

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2. HAZARDS IDENTIFICATION

Classification

Physical Hazard:	Flammable Liquid	Category 2
Health Hazard:	Skin Irritation	Category 2
	Eye Irritation	Category 2B
	STOT, Single Exposure	Category 3
	Aspiration Hazard	Category 1

Label Elements

Symbol

Signal Word

Danger

Hazard Statement(s)

H225	Highly flammable liquid and vapor.
H336	May cause drowsiness or dizziness.
H304	May be fatal if swallowed and enters airways.
H315+H320	Causes skin and eye irritation.

Precautionary Statement(s)

P210	Keep away from heat, sparks, open flames, hot surfaces. — No smoking.
P233	Keep container tightly closed.
P241	Use explosion-proof electrical, ventilating, and lighting equipment.
P242	Use only non-sparking tools.
P243	Take precautionary measures against static discharge.
P261	Avoid breathing mist, vapors, or spray.
P264	Wash hands thoroughly after handling.
P271	Use only outdoors or in a well-ventilated area.
P280	Wear protective gloves, eye protection, and protective clothing.
P301+P310	If swallowed: Immediately call a doctor.
P331	Do NOT induce vomiting.
P303+P361+P353	If on skin (or hair): Take off immediately all contaminated clothing. Rinse skin with water.
P305+P351+P338	If in eyes: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P332+P337+P313	If skin or eye irritation occurs: Get medical attention.
P304+P340	If inhaled: Remove person to fresh air and keep comfortable for breathing.
P312	Call a doctor if you feel unwell.
P362+P364	Take off contaminated clothing and wash it before reuse.
P403+P235+P233	Store in a well-ventilated place. Keep cool. Keep container tightly closed.
P405	Store locked up.
P501	Dispose of contents and container in accordance with local regulations.

Hazards Not Otherwise Classified: None.

Ingredients(s) with Unknown Acute Toxicity: None.

3. COMPOSITION AND INFORMATION ON HAZARDOUS INGREDIENTS

Substance: Ethanol (10 % volume fraction) in Reference Fuel

Other Designations

Reference gasoline: synthetic gasoline blend; reformulated gasoline.

2,2,4-trimethylpentane: isooctane; isobutyltrimethylmethane; iso-octane.

n-Heptane: normal heptane; dipropyl methane; heptyl hydride; heptane.

Ethanol: ethyl alcohol; ethyl hydrate; ethyl hydroxide; ethylic alcohol.

Components	CAS Number	EC Number (EINECS)	Nominal Volume Concentration (%)
Reference fuel gasoline	8006-61-9	232-349-1	90
Ethanol	64-17-5	200-578-6	10
Individual Components of Reference Gasoline in SRM 1838			
2,2,4-Trimethylpentane	540-84-1	208-759-1	82
n-Heptane	142-82-5	205-563-8	8

4. FIRST AID MEASURES

Description of First Aid Measures

Inhalation: If adverse effects occur, remove to well-ventilated (uncontaminated) area. If breathing is difficult, qualified personnel may administer oxygen. If not breathing, qualified personnel should give artificial respiration. Seek immediate medical attention.

Skin Contact: Rinse affected skin with water for at least 15 minutes, then wash thoroughly with soap or mild detergent and water. If skin irritation persists, seek medical aid and bring the container or label.

Eye Contact: Immediately flush eyes, including under the eyelids, with copious amounts of water for at least 15 minutes. Seek immediate medical attention.

Ingestion: Contact local poison control immediately; if vomiting occurs, keep head lower than hips to prevent aspiration. If unconscious, turn head to side; get medical attention immediately.

Most Important Symptoms/Effects, Acute and Delayed: Potential aspiration hazard, blood damage, liver damage, central nervous system depression, cancer hazard (in humans).

Indication of any immediate medical attention and special treatment needed, if necessary: If any of the above symptoms are present, seek immediate medical attention.

5. Fire Fighting Measures

Fire and Explosion Hazards: Severe fire hazard. Vapor/air mixtures are explosive above the flash point. Vapors or gases may ignite at distant ignition sources and flash back. See Section 9, "Physical and Chemical Properties" for flammability properties.

Extinguishing Media

Suitable: Regular dry chemical, carbon dioxide, water, or alcohol-resistant foam.
Unsuitable: None listed.

Specific Hazards Arising from the Chemical: Not applicable.

Special Protective Equipment and Precautions for Fire-Fighters: Move container from fire area if it can be done without personal risk. Avoid inhalation of material or combustion by-products. Wear full protective clothing and NIOSH-approved self-contained breathing apparatus (SCBA).

NFPA Ratings (0 = Minimal; 1 = Slight; 2 = Moderate; 3 = Serious; 4 = Severe)

Health = 2 Fire = 3 Reactivity = 0

6. Accidental Release Measures

Personal Precautions, Protective Equipment and Emergency Procedures: Use suitable protective equipment; see Section 8, "Exposure Controls and Personal Protection". Keep out of waters supplies and sewers.

Methods and Materials for Containment and Clean up: Avoid heat, flames, sparks and other sources of ignition. Stop leak if possible without personal risk, with water spray to reduce vapors. Absorb spilled material with sand or non-combustible material and collect in appropriate container for disposal.

7. Handling and Storage

Safe Handling Precautions: See Section 8, "Exposure Controls and Personal Protection".

Storage and Incompatible Materials: Store in a well-ventilated area. Store in a tightly closed container. Store in a cool, dry place. Keep separated from incompatible substances (oxidizing materials, halogens, metal salts, acids, bases, combustible materials).

8. Exposure Controls and Personal Protection

Exposure Limits			
Components	**OSHA (PEL)**	**ACGIH (TLV)**	**NIOSH (REL)**
2,2,4-trimethylpentane	No occupational limits established.		
Ethanol	TWA: 1900 mg/m^3 (1000 ppm)	STEL: 1000 ppm	TWA: 1900 mg/m^3 (1000 ppm) IDLH: 3300 ppm (10 %LEL)
n-Heptane	TWA: 2000 mg/m^3 (500 ppm)	TWA: 400 ppm STEL: 500 ppm	TWA: 350 mg/m^3 (85 ppm) Ceiling (15 min): 1800 mg/m^3 (440 ppm) IDLH: 750 ppm

Engineering Controls: Provide local exhaust or process enclosure ventilation system. Ensure compliance with applicable exposure limits.

Personal Protection Measures: In accordance with OSHA 29 CFR 1910.132, subpart I, wear appropriate Personal Protective Equipment (PPE) to minimize exposure to this material.

Respiratory Protection: If workplace conditions warrant a respirator, a respiratory protection program that meets OSHA 29CFR 1910.134 must be followed. Refer to NIOSH 42 CFR 84 for applicable certified respirators.

Eye Protection: Splash resistant safety goggles and emergency eyewash are recommended.

Skin and Body Protection: Chemical resistant clothing and gloves are recommended.

9. PHYSICAL AND CHEMICAL PROPERTIES

Note: No data is available for the mixture. The properties of the individual components are listed below.

Properties	**2,2,4-Trimethylpentane (82 % of SRM)**	**Ethanol (10 % of SRM)**	***n*-Heptane (8 % of SRM)**
Molar Mass (g/mol)	114.23	46.07	100.21
Molecular Formula	C_8H_{18}	C_2H_6O	C_7H_{16}
Appearance (physical state, color, etc.)	clear, colorless, free-flowing liquid	clear, colorless liquid	clear, colorless liquid
Odor	gasoline odor	alcohol odor	gasoline odor
Odor threshold	not available	5 ppm to 10 ppm	200 ppm
pH	not available	not available	not available
Evaporation rate	<1 (ether = 1)	1.4 (carbon tetrachloride = 1)	2.8 (butyl acetate = 1)
Melting point/freezing point	–107 °C (–161 °F)	–117 °C (–179 °F)	–91 °C (–132 °F)
Relative Density (water = 1)	0.6919	0.7893	0.6837
Density	not available	not available	not available
Vapor Pressure	41 mmHg at 21 °C	40 mmHg at 19 °C	40 mmHg at 20 °C
Vapor Density (air = 1)	3.9	1.59	3.45
Viscosity	not available	1.22 to 1.41 cP at 20 °C	not available
Solubilities	immiscible with water; soluble in ether, alcohol, acetone, benzene, toluene, chloroform, xylene, carbon disulfide, carbon tetrachloride, dimethylformamide, oils	miscible with water; soluble in benzene, ether, acetone, chloroform, methanol, and organic solvents	0.005 %soluble in water; soluble in ethanol, ether, chloroform and acetone.
Partition coefficient (n-octanol/water)	not available	not available	not available
Thermal Stability Properties			
Autoignition Temperature	415 °C (779 °F)	363 °C (685 °F)	204 °C (399 °F)
Thermal Decomposition	not available	not available	not available
Initial boiling point and boiling range	99 °C (210 °F)	78.3 °C to 78.5 °C (172.9 °F to 173.3 °F)	98 °C (208 °F)
Explosive Limits, LEL (Volume %)	1.1	3.3	1.05
Explosive Limits, UEL (Volume %)	6	19	6.7
Flash Point (Closed Cup)	–12 °C (10 °F)	13 °C (55 °F)	–4 °C (24.8 °F)
Flammability (solid, gas)	not available	not available	not available

10. STABILITY AND REACTIVITY

Reactivity: This material is stable at normal temperatures and pressure.

Stability: X Stable _____ Unstable

Possible Hazardous Reactions: Not applicable.

Conditions to Avoid: Avoid heat, flames, sparks, and other sources of ignition. Minimize contact with material. Avoid inhalation of material or combustion by-products. Keep out of water supplies and sewers.

Incompatible Materials: Oxidizing materials, halogens, metal salts, halocarbons, metal oxides, peroxides, acids, bases, combustible materials.

Hazardous Decomposition: Oxides of carbon.

Hazardous Polymerization: _____ Will Occur X Will Not Occur

11. TOXICOLOGICAL INFORMATION

Route of Exposure: X Inhalation X Skin X Ingestion

Symptoms Related to the Physical, Chemical and Toxicological Characteristics: Skin irritation, eye irritation, central nervous system depression, and nerve damage.

Potential Health Effects (Acute, Chronic, and Delayed)

Inhalation: Acute exposure may result in irritation, headache, drowsiness, dizziness, vomiting, sleep disturbances, emotional disturbances, tremors, loss of coordination, visual disturbances, difficulty breathing, and irregular heartbeat. Chronic exposure may result in the same effects as acute exposure and nerve damage.

Skin Contact: Acute exposure may cause irritation and prolonged exposure may cause defatting of the skin.

Eye Contact: Exposure may result in irritation and other reversible effects.

Ingestion: Possible aspiration hazard. Exposure may cause the same effects as listed for inhalation.

Numerical Measures of Toxicity

Acute toxicity: Not classified.

2,2,4-Trimethylpentane:	Rat, Oral, LD50: >2500 mg/kg Rat, Inhalation, LC50: 47.4 mg/L (1 h)
Ethanol	Rat, Oral, LD50: 7060 mg/kg; 15 010 mg/kg Rat, Inhalation, LC50: 5900 mg/m^3 (6 h); 20 000 ppm (10 h)
n-Heptane:	Mouse, Oral, LD50: 5000 mg/kg Rat, Inhalation, LC50: 103 g/m^3 (4 h); 48 000 ppm (4 h) Rabbit, Dermal LD50: 3000 mg/kg

Skin corrosion/irritation: Category 2

2,2,4-Trimethylpentane:	may cause irritation, redness, and defatting of the skin.
Ethanol:	Rabbit, Skin, 20 mg (24 h) moderate
n-Heptane:	may cause irritation, redness, burning and defatting of the skin.

Serious eye damage/eye irritation: Category 2B

2,2,4-Trimethylpentane:	may cause irritation with redness.
Ethanol:	Rabbit, Eyes, 100 µL moderate; 100 mg (4 s) moderate; 500 mg severe.
n-Heptane:	may cause irritation, redness, burning and blurred vision.

Respiratory sensitization: Classification not possible; no data available.

Skin sensitization: Classification not possible.

2,2,4-Trimethylpentane:	no data available.
Ethanol:	allergic reactions to alcohol have been reported.
n-Heptane:	no data available.

Germ Cell Mutagenicity: Classification not possible.

2,2,4-Trimethylpentane:	Rat: 500 mg/kg
Ethanol:	Ethanol, Human: 15 mmol/L (24 h)
n-Heptane:	no data available.

Carcinogenicity: Not classified.

Listed as a Carcinogen/Potential Carcinogen _____ Yes X No

2,2,4-Trimethylpentane, ethanol, *n*-heptane are not listed by IARC, NTP and OSHA as carcinogens/potential carcinogens. IARC lists ethanol (as related to alcoholic beverages) as Group 1 (carcinogenic to humans); this SRM is not for human consumption.

Reproductive Toxicity: Classification not possible.

2,2,4-Trimethylpentane:	no data available
Ethanol:	Oral, Rat, TDLo: 4 g/kg (pregnant 6-15 days)
n-Heptane:	no data available

STOT, Single Exposure: Category 3, Central Nervous System Depressant

2,2,4-Trimethylpentane, ethanol, *n*-heptane components have shown central nervous system depressant effects.

STOT, Repeated Exposure: Classification not possible; no data available.

Aspiration Hazard: Category 1

2,2,4-Trimethylpentane and *n*-heptane are aspiration hazards.

12. ECOLOGICAL INFORMATION

Ecotoxicity Data

Aquatic Toxicity

2,2,4-Trimethylpentane:	No data available.
Ethanol	Fish: Rainbow trout (*Oncorhynchus mykiss*) LC50: 12 to 16 mL/L (static 96 h). Invertebrate: Water flea (*Daphnia magna*) EC50: 2 mg/L (static 48 h).
n-Heptane	Fish: Cichlid fish (*Haplochromi burtoni*) LC50: 375.0 mg/L (96 h).

Persistence and Degradability: No data available.

Bioaccumulative Potential: No data available.

Mobility in Soil: No data available.

Other Adverse effects: No data available.

13. DISPOSAL CONSIDERATIONS

Waste Disposal: Dispose in accordance with all applicable federal, state, and local regulations. Subject to hazardous waste regulations US EPA 40 CFR 262: Hazardous waste number D001.

14. TRANSPORTATION INFORMATION

U.S. DOT and IATA: UN1203, Gasoline; Hazard class 3, packing group II.

15. REGULATORY INFORMATION

U.S. Regulations

CERCLA Sections 102a/103 (40 CFR 302.4): 2,2,4-Trimethylpentane: 1000 (454 kg) final RQ.

SARA Title III Section 302 (40 CFR 355.30): None of the components are regulated.

SARA Title III Section 304 (40 CFR 355.40): None of the components are regulated.

SARA Title III Section 313 (40 CFR 372.65): None of the components are regulated.

OSHA Process Safety (29 CFR 1910.119): None of the components are regulated.

SARA Title III Sections 311/312 Hazardous Categories (40 CFR 370.21):

ACUTE HEALTH:	Yes
CHRONIC HEALTH:	Yes
FIRE:	Yes
REACTIVE:	No
PRESSURE:	No

State Regulations

California Proposition 65: Ethanol (as related to alcoholic beverages) is listed as a chemical know to the state of California to cause cancer and reproductive/developmental effects; this SRM is not for human consumption.

U.S. TSCA Inventory: 2,2,4-Trimethylpentane, *n*-heptane, and ethanol are listed.

T**SCA 12(b), Export Notification:** Heptane: 1 % de minimus concentration.

Canadian Regulations: WHMIS Information is not provided for this material.

16. OTHER INFORMATION

Issue Date: 10 April 2014

Sources: ChemADVISOR, Inc., MSDS *2,2,4-Trimethylpentane*, 23 December 2013.
ChemADVISOR, Inc., MSDS *n-Heptane*, 07 February 2014.
ChemADVISOR, Inc., MSDS *Ethyl Alcohol*, 07 February 2014.

Key of Acronyms:

ACGIH	American Conference of Governmental Industrial Hygienists	NTP	National Toxicology Program
CAS	Chemical Abstracts Service	OSHA	Occupational Safety and Health Administration
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act	PEL	Permissible Exposure Limit
CFR	Code of Federal Regulations	RCRA	Resource Conservation and Recovery Act
DOT	Department of Transportation	REL	Recommended Exposure Limit
EINECS	European Inventory of Existing Commercial Chemical Substances	RQ	Reportable Quantity
EPCRA	Emergency Planning and Community Right-to-Know Act	RTECS	Registry of Toxic Effects of Chemical Substances
IARC	International Agency for Research on Cancer	SARA	Superfund Amendments and Reauthorization Act
IATA	International Air Transportation Agency	SCBA	Self-Contained Breathing Apparatus
IDLH	Immediately Dangerous to Life and Health	SRM	Standard Reference Material
LC50	Lethal Concentration	STEL	Short Term Exposure Limit
LD50	Median Lethal Dose or Lethal Dose, 50 %	STOT	Specific Target Organ Toxicity
LEL	Lower Explosive Limit	TLV	Threshold Limit Value
MSDS	Material Safety Data Sheet	TPQ	Threshold Planning Quantity
NFPA	National Fire Protection Association	TSCA	Toxic Substances Control Act
NIOSH	National Institute for Occupational Safety and Health	TWA	Time Weighted Average
NIST	National Institute of Standards and Technology	UEL	Upper Explosive Limit
n.o.s.	Not Otherwise Specified	WHMIS	Workplace Hazardous Materials Information System

Disclaimer: Physical and chemical data contained in this SDS are provided only for use in assessing the hazardous nature of the material. The SDS was prepared carefully, using current references; however, NIST does not certify the data in the SDS. The values for this material are given in the NIST Certificate of Analysis.

Users of this SRM should ensure that the SDS in their possession is current. This can be accomplished by contacting the SRM Program: telephone (301) 975-2200; fax (301) 948-3730; e-mail srmmsds@nist.gov; or via the Internet at http://www.nist.gov/srm.